Carroll Overhead Bridge
Altamont Pass Road
Livermore Vicinity
Alameda County
California

HAER No. CA-52

HAER
CAL,
1-LIVMO.V,
1—

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, CA 94102

HAER
CAL,
1-LIVMO.V,
1-

HISTORIC AMERICAN ENGINEERING RECORD

CARROLL OVERHEAD BRIDGE

HAER No. CA-52

Location: Altamont Pass Road, post mile 1.6, east of the City of Livermore, Alameda County, California.

UTM: 10.649350.4201690
Quad: Altamont, Calif. 7.5'

Date of Construction: 1922-1923.

Present Owner:
County of Alameda
Public Works Agency
Road Department
399 Elmhurst Street
Hayward CA 94544

Present Use: Vehicular Bridge.

Significance: The Carroll Overhead Bridge is composed of 26 spans of reinforced concrete T beams, with a curvilinear alignment and superelevation. Built in 1922-1923, it is the longest bridge of its type and age in the tri-county area of Alameda, Contra Costa and Santa Clara Counties. It is one the earliest curvilinear alignment concrete bridges in California. It is associated with the careers of two locally significant engineers: P.A. Haviland and George A. Posey. It has been determined eligible for inclusion in the National Register, meeting Criteria B and C at the local level.

Historian:
John W. Snyder
Consulting Architectural Historian
1372 Fitch Way
Sacramento CA 95864

DESCRIPTION

The Carroll Overhead Bridge, Bridge No. 33C-02, located on Altamont Pass Road at post mile 1.6 is a reinforced concrete structure of 26 spans. Each span is composed of five reinforced concrete T-beams; the spans are carried on 25 reinforced concrete two-column bents and reinforced concrete abutments, all founded on timber piles. The bridge is 540 feet long, 24 feet wide, and carries two traffic lanes between solid concrete parapet railings detailed with indented panels. The structure carries Altamont Pass Road over the (now abandoned) Southern Pacific Railroad and Altamont Creek, its serpentine alignment chosen to meet the exigencies of the topography and to avoid encroaching on the alignment of the Western Pacific (now Union Pacific) Railroad.

HISTORY

The designers of the Carroll Overhead chose their design carefully in order to solve several unique problems imposed by the site of the structure. The location of the existing Western Pacific (now Union Pacific) and Southern Pacific Railroad tracks, coupled with the topography of the narrow canyon and the location of Altamont Creek, severely constrained the location of the roadway and the choice of sites for the bridge. Approaching from the west, the roadway was sandwiched between the rights of way of the two railroads. The bridge had to cross Altamont Creek and the existing Southern Pacific track while providing sufficient clearance for a future second Southern Pacific track, touching down again on the hillside east of tracks and creek. The hillside termination design had the benefit of conserving space and hence was less costly, since a lengthy approach to gain elevation was unnecessary. The result was a custom design which met the unique site constraints, and which was well ahead of its time in terms of design technology.

The innovations exemplified by the Carroll Overhead lay not in the basic design: the bridge is simply made up of a large number of T-beam spans supported on two-column bents. This type of design was quite well developed even as early as 1922. Indeed, it represented what were coming to be appreciated as some of the best features of reinforced concrete construction: the use of small, standard-sized, easily manageable elements combined into a larger whole. This type of technology had made itself well-known in the building trades during the reconstruction of San Francisco following the 1906 earthquake and fire, a period in which reinforced concrete made great strides. Rather, it was in the use of a compound-curved design, and the use of superelevation, that the Carroll Overhead stood apart from its contemporaries.

During the first quarter of the 20th century, the design tenets of the 19th century still were strong. Most bridges--even new reinforced concrete bridges--were built at right angles to the stream or feature crossed, and without horizontal or vertical curves on the bridge. Indeed, with regard to the State Highway system, it was not to be until the term of Harlan D. Miller as State Bridge Engineer in 1924-1927 that the State would begin to move in new, more modern design directions. Yet here one finds in the Carroll Overhead a bridge which utilizes both horizontal and vertical curves, as well as superelevation. This latter feature caused difficulties for the construction forces in correct placement of formwork. Exactly to whom this innovative design may be attributed is still not clear. Two individuals--Perry A. Haviland, County Surveyor 1907-1921, and George A. Posey, Deputy County Surveyor 1913-21 and County Surveyor 1921-1932--were involved with the design of the Carroll Overhead.

Perry A. Haviland, born in Fort Dodge, Iowa, trained in civil engineering at Iowa State College. First employed by the Union Pacific Railroad, he later moved to San Luis Obispo and then to Oakland in 1890. Beginning in 1907, he held the elected position as Alameda County Surveyor until 1921. One of his first projects in this post was the construction of East 14th Street from Oakland to Hayward, followed by such efforts as the construction of the Niles Bridge and a survey of Richmond Harbor. As was typical of many in his position, during this period he continued in the position as a principal in the firm of Haviland and Tibbets, Consulting Engineers. (Interestingly, his firm had, in the first years of the 20th century, employed John B. Leonard, who became perhaps the most important individual in the development of reinforced concrete technology in California in the first quarter of this century.)

George A. Posey, following graduation from Berkeley High School, attended the University of California, from which he was graduated in 1906. Paralleling Haviland's career, Posey's first position was in the employ of the Southern Pacific Railroad, then in the throes of major reconstruction under the administration of Harriman regime. Shortly thereafter, he returned to the University of California as an instructor of civil engineering. Between 1907 and 1910 the Mount Whitney Power Company of Visalia employed him in sites for dams and power generating facilities. In 1910, Haviland and Tibbets hired Posey, and he worked on their projects throughout California, including in Hillsboro, Larkspur, Lindsay, Winters, and Santa Maria.

In May 1913, Posey assumed the position of Deputy County Surveyor of Alameda County under Perry A. Haviland. Haviland placed Posey in charge of plans and specifications for bridges, culverts, roads, and streets. At that time he also worked for the City of

Richmond in road and tunnel construction, and oversaw the construction of the Richmond Municipal Wharf. Upon Haviland's death in 1921, the Alameda County Board of Supervisors appointed Posey to the post of County Surveyor.

Under the terms of the Alameda County charter, the County Surveyor was responsible for all construction, maintenance, and repair of roads, highways, tunnels, viaducts, conduits, subways, and bridges. During George Posey's term in this position, he undertook major improvements to the county's transportation infrastructure. He replaced all old wooden and steel bridges of inadequate width as rapidly as funds would allow, and between 1927 and 1932 increased county roads from 400 to 600 miles. Perhaps his most notable achievement was the the George A. Posey Tube, spanning beneath the Oakland Estuary to connect Oakland with Alameda.

Given the foregoing information, it is likely that Posey, whose name and title as County Surveyor appear on the final plans, actually produced the original design of the Carroll Overhead, with final approval being the responsibility of Haviland.

The Carroll Overhead was but one element in a series of improvements to what was then the Lincoln Highway. Other improvements at this time included another railroad overhead at Altamont, a few miles east, and widening of the pavement from 15 feet to 20 feet; these actions were justified by increasingly heavy traffic. It eliminated a dangerous skewed grade crossing on a railroad curve.

The County Surveyor's office originally prepared the plans for the Carroll Overhead in 1917, for an alignment determined by the State Highway Commission. However, due to the pressures of World War I, the U.S. Railway Administration (which was then operating all U.S. railroads) refused to appropriate construction funds, and the project was delayed. When it was revived in 1922, minor changes were made to the original plans: driven concrete piles were substituted for cast-in-place concrete piles; footing size was increased; superelevation was introduced at the behest of the State Highway Commission; collision walls were placed at the bents adjacent to the railroad tracks; parapet railings replaced pipe railings for increased traffic safety. Other minor changes were made during construction.

Bid advertisement took place on January 16, 1922, with the engineer's estimate being $68,000. When opened on February 20, 1922, the 14 bids received ranged from $58,900 to $99,450. The low bidder, Standard Industrial Engineering Corporation, received the contract, approved on March 6, 1922. The county allowed for completion in six months, extending that time on September 5,

1922.

Work began on March 6, 1922, but until April 17, little was actually accomplished beyond establishing a temporary work camp, assembling materials, and undertaking borings to determine correct pile length. Winding of pile reinforcing steel began on April 17, with actual casting beginning on April 21. Between that date and June 20, 1922, no work took place beyond the casting of piles. The contractor obtained sand and gravel from Niles Sand and Gravel Company, and Portland cement from Old Mission Portland Cement Company at San Juan Bautista and from the Mt. Diablo Portland Cement Company. These materials arrived by rail. Water was obtained from a well at the bridge site. Concrete mixing was accomplished by machine, using a 7-cubic foot mixer. (Interestingly, this water source was originally rejected for high chloride content; subsequently accepted, it could be the explanation for the current spalling problems, due to chloride contamination in the concrete.) Pile driving began on June 20, using a 3,000 pound Number 2 Vulcan steam hammer with a 2.41-foot stroke. The owner removed this hammer on July 29, and pile driving did not resume until October 11, 1922, this time with a 3,600 pound hammer.

The contractor's forces began pouring footings, which had been excavated by pick and shovel, on July 18, 1922, and did not begin the first pour of beam girder and slab section until October 9. The initial use of poor form lumber caused problems upon stripping, and the county required the contractor to replace some forms and use better lumber. Since the time allowed for completion of the work expired on September 6, 1922, the contractor asked for, and received, an indefinite extension, though the Board of Supervisors, in granting the extension, placed the contractor on probation. The contractor poured the last of the parapet concrete on January 17, 1923, and finished clean-up and painting work in March. When the painted structure did not present a uniform appearance to the county's inspector, the Ariste Paint Company of San Francisco applied a final coat of cement paint by sprayer. The Board of Supervisors accepted the completed bridge on March 6, 1923, at a final cost of $53,428.32, divided evenly between Alameda County and the Southern Pacific Railroad.

The Board found that much of the delay in completion was due to the contractor's lack of funds and unwillingness to pay bills and wages. This had delayed receipt of materials and a constantly changing work force due to dissatisfaction. They also cited poor management at the job site. However, in the final analysis, the Board decided that, due to good inspection during construction and the desire of the contractor to produce a good structure, they had received an excellent bridge, pleasing to the eye and

with good riding qualities.

PROJECT INFORMATION

The proposed project entails the replacement of the Carroll Overhead, followed by the demolition of the structure. The existing bridge, composed of 26 spans totaling 540 feet in length, 24 feet in width, will be replaced by a culvert roadway to the south of the structure. The Carroll Overhead, built to early design standards, has reached the end of its useful life. The roadway width, parapet railings, and vertical and horizontal curves do not conform to current standards. The quality of the concrete is uncertain, and extensive spalling is evident on a number of structural members; the bridge is considered to be in poor condition, inadequate for current loadings. Due to the abandonment of the Southern Pacific railroad right of way, one of the major site constraints which led to the design of the existing bridge has been removed. Thus the only obstacle facing the new roadway is Altamont Creek, a minor intermittent waterway. The gain in altitude required to carry the Carroll Overhead above the Southern Pacific tracks is no longer necessary. The new crossing, to be located slightly to the south of the existing bridge, will be on a curved alignment which physically encroaches on the northwest abutment of the Carroll Overhead. The new alignment will provide safer horizontal and vertical sight distance and will enhance riding qualities. The Carroll Overhead is to be documented to the standards of the Historic American Engineering Record and, following acceptance of the recordation, demolished. The project is estimated to cost $670,000.

BIBLIOGRAPHY

Books

A. Davis, *Davis' Commercial Encyclopedia of the Pacific Southwest*, Berkeley, 1911.

G. Tinkham, *California, Men and Events*, Stockton, 1915.

Articles

"George A. Posey, County Surveyor," *Observer*, Oakland, 1921.

G. Posey, "The Splendid Highway System of Alameda County," *Oakland Tribune Year Book*, 1932.

J. Snyder, "Bridges and Buildings for the 20th Century," *California History*, Fall 1984.

Manuscripts

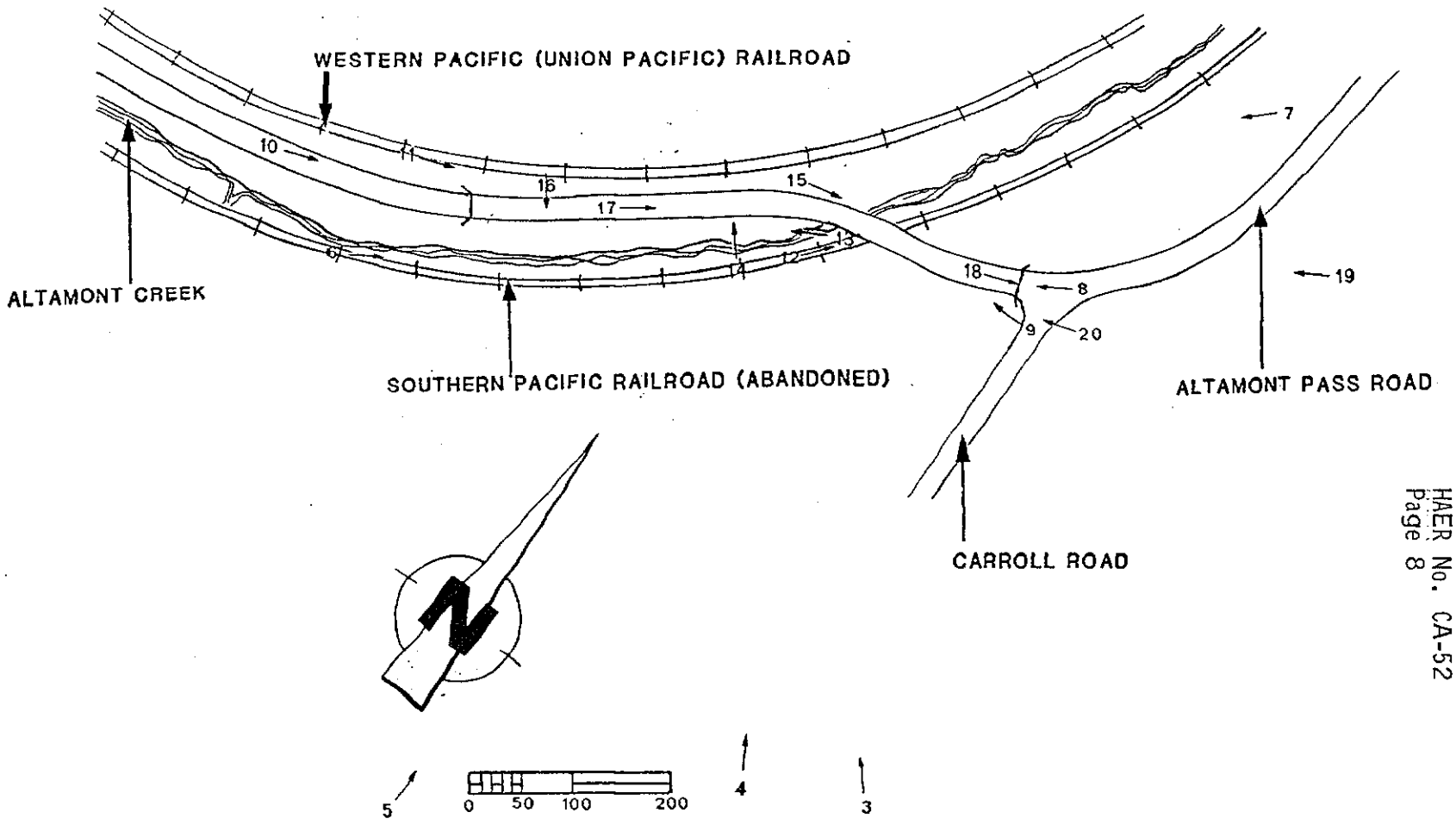
S. Guedon, "Request for Determination of Eligibility for Inclusion in the National Register of Historic Places, Carrol *[sic]* Overhead Bridge (33C-06) on Altamont Pass Road (Post Mile 1.6), County of Alameda, California," Basin Research Associates, Inc., Hayward, March 1985, revised September 1985.

S. Guedon, "Preliminary Case Report for Carrol *[sic]* Overhead Bridge (No. 33C-06) Replacement Project on Altamont Pass Road (Post-Mile 1.6), County of Alameda, California," Basin Research Associates, Inc., March 1985, revised September 1985.

T. Harrington, "Revised Original Report, Bridge No. 33C-06," California Department of Transportation, Sacramento, March 24, 1981.

B. Jameyson, "Report on the Construction of the Carroll Overhead Crossing," County of Alameda, Public Works Agency, Road Department, Hayward, April 20, 1923.

J. Snyder, "An Evaluation of Van Duzen River Bridge on 01-Hum-101, P.M. 56.7/57.2," California Department of Transportation, Sacramento, January 9, 1980.



CARROLL OVERHEAD BRIDGE

SITE MAP & CAMERA LOCATIONS